SPELLING DEFICITS IN MENTALLY RETARDED CHILDREN : A COMPARISON OF ALTERNATIVE REMEDIATION STRATEGIES

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C O N T E N T S

A B S T R A C T

In this study, the efficacy of three alternative techniques for remediating spelling deficits in moderately mentally retarded children was evaluated. Two experiments are reported. In Experiment 1 the differential effects of overcorrection and imitation training were compared against a no-training control condition in an alternating treatments design. While both remediation procedures were superior to the no-training control condition, imitation training produced the best results with four moderately mentally retarded subjects. In Experiment 2, the efficacy of imitation training was compared to interspersal training and a no-training control condition in an alternating treatments design. Both remediation procedures markedly increased spelling performance when compared to the no-training control condition. The imitation training procedure was superior to interspersal training with two subjects and as effective as interspersal training with the third. These results were discussed in light of the literature on remediating spelling deficits, in particular, those studies involving mentally retarded individuals.

INTRODUCTION

Spelling has been defined as "the ability to recognise, recall, reproduce, or obtain orally or in written form the correct sequence of letters in words" (Graham & Miller, 1979). So, spelling is multi-faceted and requires mastery of a variety of skills. It is an important skill as it is a fundamental element involved in writing. Poor spellers are burdened by their inability to communicate freely through the written word, while good spellers can express their ideas fluently on paper without unnecessary interruptions. Correct spelling is often associated with educational achievement while the inability to spell is associated with illiteracy (Personkee & Yee, 1971). The importance of spelling achievement, emphasized by the general public and educational groups, means that the inability to spell correctly may adversely affect an individual's educational and occupational status (Graham & Miller, 1979). This problem is further compounded in mentally retarded individuals with their assumed lower academic ability.

Despite a large and increasing body of research regarding spelling remediation, spelling difficulties continue to be a problem of significant proportions. Investigations by Fox and Easton (1946) showed that 48% of children in grades 2 through 8 functioned at least one grade lower in their spelling skills. Similar findings have been reported in more recent studies (e.g., Ollendick, 1979). The overall spelling achievement in schools is noted to be less than it was 30 to 40 years ago (Horn, 1960). Results of a survey by Ollendick (1979) showed that 40% of children in grades 3 to 6 scored below their grade level in spelling with 17% scoring one or more grades below their expected age level.

Spelling is part of the basic elementary school cirriculum with formal instruction generally beginning at the end of grade 2 (Hammel, Larsen & McNutt 1977). Traditionally, spelling instruction has involved teachers as dispensers of drill activities with students as memorizers of assigned word lists. Traditional techniques that have been used to teach spelling and remediate problems have included: Fernald's (1943) multisensory approach, developmental teaching methods (Hanna & Moore, 1953; Horn, 1957), Schoolfield and Timberlake's (1960) phonetic system, Gilstrap's (1962) part-by-part method, Montessori's (1965) sensory approach, Gillingham's alphabetic system (Gillingham & Stillman, 1970), and Westerman's (1971) Visual-Vocal method. While many children learn to spell adequately through these traditional procedures, others experience repeated failure so alternative and remedial strategies must be sought.

Since the early 1970s, more experimentally based research has been carried out with regard to teaching spelling and remediating spelling difficulties. The growing influence of applied behaviour analysis and behavioural techniques have had significant impact in the area of spelling and changed the direction of this type of research. Spelling research has focused on three basic areas: the speller, the word to be spelled, and methods of instruction. Initially this research considered the speller. Incentive conditions were manipulated to increase levels of motivation which resulted in improved spelling performance. Programmes using tokens that can be exchanged for material rewards have been shown to be effective in increasing classroom learning including spelling in both handicapped and non handicapped individuals (Benowitz & Busse, 1976; Chadwick & Day, 1971; Evans & Oswalt, 1967; Koven & LeBow, 1973; McLaughlin & Malaby, 1972;

Rayek & Nesselroad, 1972). In addition, it has been found that tangible reinforcers administered contingent upon accuracy in spelling tests were more successful than social reinforcement (Axelrod, Whittaker & Hall, 1972; Benowitz & Busse, 1976; Benowitz & Rosenfield, 1973).

Other approaches to the remediation of spelling deficiencies focusing on the speller have included the "Good Behaviour Game" (Axelrod & Paluska, 1975), contingency management procedures (Benowitz & Busse, 1976; Lovitt, Guppy & Blattner, 1969; McLaughlin 1982); peer tutoring (Delquadri, Greenwood, Stretton, & Hall, 1983; Dineen, Clark & Risley, 1977; Harris, Sherman, Henderson & Harris, 1972; Mulvaney, Fitzhugh, Wagner & Hughes, 1980; Stowitschek, Hecimovic, Stowitschek & Shores, 1982); and parent tutoring (Broden, Beasley, Vance Hall, 1978, Koven & LeBow 1973). While these studies have indicated that behavioural procedures can be successfully utilized to remediate spelling deficits, most have involved low achieving children of average intelligence, with little attention directed toward mentally retarded individuals.

The use of peers to increase spelling achievement has been described in two different types of procedures: peer tutoring and the Good Behaviour Game. The differential efficacy of peer tutoring and individualized study was first evaluated by Harris et al (1972). Results from thisstudy indicated that weekly test gains from pretest (on Monday) to posttest (Friday) were consistently higher for word lists learnt through peer-tutoring than for comparison word lists which were learnt individually. The elements of the tutoring procedure were not explicitly described so it would be invalid to attempt to explain the weekly spelling gains by any specific action or interaction.

However, this study introduced a possible alternative approach to remediating spelling deficits.

Dineen et al (1977) extended this type of research by experimentally evaluating the benefits of peer tutoring to the tutor who tutored spelling words to his peers. Three elementary students of normal intelligence but with a two-year reading deficiency were either tutored by another individual, provided the tutoring, or neither gave nor received tutoring. The results of this investigation showed a mean percentage change across the three subjects in the number of words spelt correctly from pretest to posttest as: a loss of 1% on nontrained (control) words, a gain of 59% on tutee words, and a gain of 47% on tutor words. Thus spelling improvement was almost equivalent on the words individuals were either tutored on, and/or tutored by a peer.

Two studies explored the possibility of peer tutoring among low achieving and mentally retarded individuals (Davis 1972; Mulvaney, Fitzhugh, Wagner & Hughes, 1980). Students in the Davis (1972) study were regarded as remedial rather than retarded, scoring at least two grades below on Stanford Achievement Tests. Results of this study showed that the program was highly effective as an instructional procedure, in which both the tutor and tutee improved their spelling performance. In the Mulvaney et al (1980) study, a 54-year-old hospitalised mentally retarded male tutored a 48-year-old hospitalised mentally retarded female in spelling. The tutoring procedure initially consisted of physically guiding the tutee's hands in forming letters on paper with pencil and constant feedback regarding the correctness of her printing. Physical guidance was gradually faded so the tutee was able to respond to her tutor's instructions to spell words previously taught to her. This study provides positive results

indicating that peer tutoring between mentally retarded individuals was not only possible but also very successful. However, the subjects in this study were boyfriend and girlfriend which undoubtedly explains why they worked so well together and questions the generalizability of these findings.

The use of peers is different in studies of the Good Behaviour Game as applied to spelling instruction. Axelrod and Paluska (1975) used a regular classroom of third and fourth graders to evaluate spelling achievement through use of the Good Behaviour Game. During the game condition, pupils were divided into two teams of children with approximately equivalent skills. The winning team, which was determined by higher scores on daily spelling tests, were reinforced individually. A game plus prize condition was also implemented in which a small prize was also awarded to each participant of the winning team. Results from this investigation indicated that use of the game alone did not accomplish significant gains in spelling scores for most of the pupils. However, the addition of prizes to the game condition resulted in a significant increase in spelling performance. These results confirmed earlier research findings which suggested that reinforcement is a necessary component of the procedure.

The research using parents as tutors, usually in home-based sessions, extends the peer tutoring type of procedure to incorporate parents rather than peers as tutors. In an early study by Koven and Le Bow (1973), mothers were taught to administer tokens redeemable for favoured objects contingent on correct reading and spelling. This procedure proved effective in improving reading and spelling which was maintained to some extent at a two month follow up. In a more recent study by Broden et al (1978), a mother implemented a home-based

treatment procedure for improving the in-class spelling performance of her two sons. The first tutoring procedure in this study was for a very poor third grade speller and involved (a) the presentation of each word orally, (b) praise forcorrectly spelled words, and modelling of those words misspelled. These sessions were implemented at home for three nights before the Friday spelling posttest at school. A reversal design was utilised to assess the efficacy of home tutoring versus no home tutoring on Friday test scores. Results showed that Friday spelling scores increased markedly throughout the tutoring condition when compared to the no home tutoring condition. At the completion of this study, the mother commenced a similar home tutoring program with her seven year old son who was spelling satisfactorily but not to his optimal ability. The procedures from the first study were repeated with the exception of praise for correctly spelled words. Results again indicated marked gains in spelling scores. The possibility of utilising parents as tutors for teaching and remediating spelling deficits in mentally retarded children is as yet unresearched. In view of the positive results of research regarding parents as tutors with children of normal intelligence, similar investigations with mentally retarded children would seem justified.

From the previously mentioned studies, which have demonstrated that positive contingencies will motivate students to increase their spelling achievement, the experimental focus in spelling moved to concentrate on analysing, designing and improving methods of spelling instruction and remediation. While the earlier studies were important, they appear of limited value in the long term especially with regards to the maintenance of learned words and the acquisition of new ones. The increases in

spelling performance resulted from higher levels of motivation associated with the positive contingencies rather than any improvement in spelling skills related to the instructional method. Success of any instructional method generally is directly related to success of performance, so improved spelling instruction used with positive reinforcement should facilitate the subject's ability to spell more accurately. In addition, the emphasis in these earlier behavioural spelling studies has been directed at normal children and low achieving spellers of average intelligence. Considering the more extreme and diverse special needs of mentally retarded individuals, there is certainly a lack of studies concerned with teaching and remediating spelling difficulties in this population.

The first significant study that attempted to devise an effective instructional method to improve spelling accuracy was conducted by Foxx and Jones (1978). They utilised the principles of positive practice overcorrection and positive reinforcement, which had been more generally applied to controlling maladaptive behaviour (Foxx, 1976a, 1976b, Foxx & Azrin 1973), to design a comprehensive procedure to remediate spelling deficits in regular elementary and junior high school students. Students from four different grades (grades four, five, seven and eight) in one school, whose baseline spelling scores averaged 85% or below, participated in this study. Four procedures designed to help poor spellers improve their achievement on weekly tests were evaluated:

(1) Pretest/Test - a pretest on the week's spelling words followed in two days by the usual weekly test;

(2) Test/Positive Practice - a positive practice procedure in which students were required to remediate any misspelled word on the weekly test by writing out its (a) correct spelling, (b) correct phonetic spelling, (c) part of speech, (d) complete dictionary definition, and (e) correct usage in five sentences other than

the examples cited in the dictionary or the spelling book.

(3) Pretest/Positive Practice/Test - students were required to remediate any misspelled words in the pretest the following day and were given the usual weekly test the next day.

(4) Pretest/Postive Practice/Test/Positive Practice - in addition to the above procedure this included the positive practice requirement for any misspelled words on the usual weekly test.

Throughout this study, accurate word spelling was reinforced with teacher and parental approval, prizes, positive teacher comments, and posting of papers with high achievement. Conversely, inaccurate word spelling resulted in the implementation of the positive practice procedure. The results indicated that the final procedure - pretest/positive practice/test/positive practice was the most effective, producing a 14% increase in spelling achievement. The pretest/positive practice/test resulted in an 11% increase and the positive practice a 10% increase showing that these procedures were of equivalent efficacy, while the pretest/test procedure produced no increase. Follow-up assessment conducted the following school year on 15 of the 22 subjects still attending the school revealed maintenance of the instructional effects (mean spelling average of 91%). In addition, three of the four teachers were continuing to use the procedures, particularly with students encountering spelling difficulties. The results indicated that the procedures utilizing the positive practice component were more successful than those in which it was omitted and the procedure which produced the most significant improvement contained two positive practice sessions. Positive practice is thought to be an improvement on more traditional spelling remediation methods as it requires active and varied written responses by the student.

Subsequent studies have replicated and extended the findings of Foxx and Jones (1978). Ollendick, Matson, Esveldt-Dawson and Shapiro (1980) used an alternating treatments design to examine the comparative efficacy of positive practice overcorrection procedures when used alone, with positive reinforcement, and a no-remediation control condition. A simplified version of the positive practice procedure was implemented in which the child was required to (a) listen to the word pronounced by the teacher, (b) pronounce the word correctly, (c) say aloud each letter of the word, and (d) write the word correctly. This sequence was designed to include multiple channels of learning and was repeated five times for each misspelled word.

The subjects in this study were of average intelligence but had severe spelling deficiencies. The results indicated that the two active remediation procedures did not differ markedly although positive practice plus positive reinforcement was slightly more efficient and was preferred by subjects. A second study compared positive practice to a traditional corrective procedure. Results of this study demonstrated that positive practice plus positive reinforcement was significantly more effective than the traditional corrective procedure.

In a more recent study using mentally retarded children (one mildly retarded and two borderline), Matson, Esveldt-Dawson and Kazdin (1982) demonstrated the efficacy of positive practice and positive practice plus positive reinforcement as procedures for remediating spelling deficits. Results generally indicated the superiority of positive practice plus positive reinforcement to the positive practice alone condition, supporting previous research finding with children of normal intelligence.

In a recent attempt to remediate spelling deficits in moderately mentally retarded children, Stewart and Singh (1986) employed the

overcorrection plus positive reinforcement procedure in a multiple baseline design. Despite the lack of spelling skills prior to this study and the more severe degree of retardation, all subjects rapidly learned to spell the target words and maintained accuracy of these words over a six-month follow up period.

Overall, these studies using positive practice overcorrection indicate that this is an effective procedure for remediating spelling deficits in normal and mentally handicapped individuals. There is increasing evidence which attests to the enhanced efficacy of this procedure when combined with positive reinforcement. Overcorrection is a successful educative instructional method which provides opportunities for individuals to learn the correct response rather than to receive punishment for incorrect responses.

Several alternative methods for teaching spelling and remediating spelling deficits have been discussed in the literature. These include Add-a-word (McGuigan, 1975), imitation training (Jobes, 1975), and known-item interspersal training (Neef, Iwata & Page, 1977). By comparison to the numerous studies involving overcorrection procedures for spelling remediation, these alternative strategies have limited empirically-based evidence to support them. However, the results of studies utilising these procedures appear to be sufficiently successful that further experimental research should be conducted to more conclusively determine their efficacy in the remediation of spelling deficits.

The Add-a-word spelling program consists of individualised spelling lists, daily testing, and practice involving: (a) copying each word on the spelling list, (b) writing each word from memory, and (c) comparing student spelling of the words to the correct spelling.

This instructional method has been demonstrated to improve the spelling performance of mildly mentally retarded and behaviourally disordered children (Struthers, Bartalamay, Bell, McLaughlin, & Hunsaher, in press). Another investigation using learning disabled students evaluated the effects of the Add-a-word spelling program on spelling accuracy during creative writing (Platt-Struthers, Struthers, & Williams, 1983). The students' correct spelling of target words during creative writing increased by about 90% after the words were introduced to the Add-a-word program. In view of the successful findings, further research should consider the use of the Add-a-word program with individuals of differing degrees of mental retardation and students with normal intelligence.

Imitation training involves a direct, one-to-one interaction between the teacher and learner, and incorporates a large amount of modelling. This procedure provides spelling instruction through the process of imitation training in which the teacher models spelling words, orally and in writing, for students to imitate. Praise statements are used by the teachers to reinforce correct imitations and portions of the training procedure are repeated in the case of incorrect imitations. Stowitschek and Jobes (1977) have asserted that the oral and written models, student imitation of the response, and immediate feedback are so crucial to the success of the procedure that they have provided a fully scripted teaching format with complete instructions of the training sequence. Imitation training has been evaluated by Jobes (1975) in a study in which eight learning disabled children were successfully taught to spell a total of 280 words.

As with the positive practice overcorrection, the imitation training procedure provides variations in opportunity for individuals

to learn the correct response rather than to receive punishment for errors. Incorrect spelling merely results in a repetition of a given sequence in the imitation training procedure. These approaches support a multisensory approach to remediation which seems to be more successful than traditional techniques with mentally retarded individuals. Obviously, additional research utilising the imitation training method is necessary to enable more conclusive evidence regarding its efficacy with different populations.

The effects of interspersing "known items" among alternate test trials, so that correct responding on one trial is highly probable, has been demonstrated to increase the level of acquisition of discreet behavioural repertoires such as picture identification (Kircher, Pear & Martin, 1971). Neef, Iwata and Page (1977) compared the effects of interspersing known items and a control procedure using high density reinforcement during the acquisition and retention of spelling and sight reading words. Results indicated that the interspersal of known words produced higher acquisition and retention rate than the high density reinforcement condition. This study was later replicated and extended by Neef et al (1980) in which the effects of interspersal training were compared to high density reinforcement on acquisition and retention of spelling only. The results of this study indicated that interspersal training was more effective than high density reinforcement in facilitating spelling acquisition and retention. While high density reinforcement did enhance performance over baseline, the interspersal training proved markedly superior. It was suggested that the daily review of learned words as they become incorporated into interspersal items may in part account for the higher levels of spelling performance associated with this procedure. It is also possible that the frequent reinforcement accompanying the inclusion of

known items may permeate more careful attention to all the surrounding training words. Future studies involving individuals with and without mental retardation are needed to determine the general applicability of this procedure and to provide further support for the efficacy of this approach in the remediation of spelling deficiencies.

The third area of spelling research has focused on the word to be spelled. This type of research, usually involving the anlysis and assessment of spelling errors, has been minimal in comparison to the other two research areas. The most effective procedures for spelling remediation in both retarded and non-retarded individuals seems to focus on an active intervention rather than a posterioi analysis of spelling error patterns. Determining patterns in spelling errors may assist a teacher in planning which remedial instruction may be most appropriate for a particular problem speller, however the active implementation of procedures cannot be immediate in this instance. As time is a limited resource, particularly in special education classrooms where the learning disabled have so much to learn, it is vital that the most effective and efficient methods for remediation be utilised.

While a growing body of literature based on empirical research is beginning to produce a variety of successful procedures for remediating spelling deficits in persons of diverse academic abilities, further research is necessary to replicate and extend these findings. As yet, the various alternative instructional methods discussed have only been compared to traditional techniques and generally applied to individuals of normal intelligence. A limited number of studies investigating spelling remediation in mentally retarded individuals, clearly indicate spelling performance can be successfully improved subsequent to

treatment or intervention. Additional research on the remediation of spelling deficits in this population are not only necessary but also justified. What is currently needed are studies which consider the differential efficacy of alterntive instructional methods. There may in fact be instructional strategies which are best suited to subjects at different ability levels. In addition, further studies are necessary with children who are moderately and mildly retarded as little experimental attention has been paid to this population.

The most effective procedures for remediating spelling deficits, particularly in mentally retarded individuals, seems to involve active teacher and student involvement, some form of positive reinforcement to keep the child motivated and maintain attention, and the utilisation of instructional methods that incorporate a multisensory approach. While numerous investigative research possibilties were uncovered, this study investigated the comparative efficacy of three different instructional methods (overcorrection, imitation training, interspersal of known items) for remediation of spelling deficits in moderately mentally retarded students.

The Alternating Treatments Design

An alternating treatments design (Barlow & Hayes 1979; Kazdin & Hartmann, 1978) was utilised in the two experiments reports in this study. In an alternating treatments design, each treatment is systematically varied and counterbalanced across stimulus conditions within the same phase. The frequent alternation of treatments minimises time correlated artefacts that may emerge when two or more treatments are tested serially as in multiple baseline or reversal designs. Stimulus conditions which can be varied in this way include

different therapists, settings, time periods and combinations of these. The alternating treatments phase is terminated when the target behaviour stabilizes under one intervention and the most effective procedure is used in the final phase to indicate clinical control.

The use of an alternating treatment design is essential to the following studies as accurate spelling is not likely to return to baseline rates during reversal, and a significant decrease in academic achievement may be detrimental for the subjects. The alternating treatments design enabled comparison of the differential impact of two training conditions and a no remediation control condition in each experiment.

The Experiments

Two experiments were conducted. Although each experiment is complete in itself, the two are inter-related in that the more effective of the two interventions from Experiment 1 is also evaluated in Experiment 2. Experiment 1 was designed to compare the effects of two training procedures overcorrection and imitation training and a no-remediation control condition. The more effective of the two training conditions was subsequently used as a training procedure in Experiment 2. The second experiment was designed to evaluate the comparative effects of a different combination of spelling instruction methods, imitation training and interspersal of known words.

Experiment 1

Effects of overcorrection and imitation training on spelling acquisiton

In recent studies, the effects of overcorrection procedures and imitation training have been investigated individually (e.g., Foxx & Jones, 1978; Stowitschek & Jobes, 1977). These studies, which have evuluated the instructional methods in comparison to more traditional techniques, have revealed that these alternative remediation strategies are highly successful. Overcorrection procedures when used alone or in combination with positive reinforcement have been effective in increasing the spelling accuracy of normal and mentally retarded children (Ollendick et al., 1980; Matson et al., 1982; Stewart & Singh, 1986), in increasing the oral reading proficiency of moderately retarded children (Singh, Singh & Winton, 1984), and in the acquisition of sign language in severely mentally retarded individuals (Linton & Singh, 1984). Imitation training procedures were effectively employed to teach eight learning disabled pupils a total of 280 words (Jobes, 1975) of which upwards of 80% were maintained following termination of training procedures.

Experiment 1 was designed to assess the comparative efficacy of these two training procedures, overcorrection and imitation training in the remediation of spelling deficits in moderately mentally retarded children.

M E T H O D

Subjects

Four students attending a special school were selected to participate in this study. All students were moderately mentally

retarded according to AAMD criteria (Grossman 1983). The etiology of retardation of three subjects - two girls (Belinda and Leanne) and one boy (Michael) - was not known. The fourth subject (Nyree) had Downs Syndrome. None of the subjects suffered from epilepsy or were on medication during the duration of the study.

Belinda was 15 years old and had attended her current school for six months. She had an I.Q. of 50-60 on the Wechsler Intelligence Scale for Children Revised (WISC-R). Her vision and hearing were not formally assessed at the time of study but school records reported them as satisfactory. Leanne was 17 years old and had attended her current school for two years. She had an I.Q. of 44 on the WISC-R and her vision and hearing were satisfactory. Michael was 14 years old and had an I.Q. of 45-55 on the Revised Stanford Binet (Form L-M). Michael's vision and hearing were reported as satisfactory. Nyree was 16 years old and had an I.Q. of 40 on the Wisc-R. Nyree wore corrective spectacles and her hearing was reported as satisfactory.

None of the subjects had received any form of spelling instruction prior to this study. The criterion for subject selection was the ability to recognise and write down on paper all the letters of the alphabet. The subjects were all from senior classes.

Setting

This study was conducted at a special school for moderately mentally retarded children aged between 5 to 18 years. Experimental sessions were conducted daily during regular school hours in the school library, a small room entirely separate from other buildings. The room was furnished with chairs and a table, situated so that the experimenter and subject could face each other and use the table top for presentation of materials and writing upon.

A graduate student in psychology was responsible for the data collection and intervention.

Stimulus Materials

Stimulus words used for the spelling exercises were taken from the Arvidson Alphabetical Spelling List (1969). These lists, which are arranged in increasing levels of difficulty, are commonly used throughout New Zealand at the primary school (grade) level. The target spelling words for each subject were selected on the basis of two paper and pencil pretest sessions. Only words that the subjects misspelt consistently in both sessions, were selected for training. For each subject, a total of fifteen words which had been misspelt was used. Words were then randomly divided into three sets of five words each: list A, list B, and list C. These word lists in turn were randomly assigned to each of the three experimental conditions: List A: No training control condition, List B: Overcorrection, and List C: Imitation training. The stimulus words for Leanne and Michael were taken from levels 1 and 2 (difficulty level), levels 4 and 5 for Nyree, and levels 5 and 6 for Belinda.

When the list of fifteen words for each subject was selected attempts were made to include a similar number of nouns, verbs and adjectives in each list and to include words with an equivalent number of letters across subjects. An exact equivalence of stimulus words selected for subjects was not possible, as they came from differing levels of difficulty.

The words used with Leanne were:

List A: children, sister, water, best, cry.

List B: friend, snow, year, plant, pretty.

List C: letter, teacher, name, large, hut.

The words used with Michael were:

List A: dress, sheep, people, rain, naughty.

List B: grass, interesting, yellow, fight, early.

List C: music, coal, teacher, leave, poor.

The words used with Nyree were:

List A: arithmetic, citizen, tobacco, reference, general.

List B: disease, bulldozer, orchestra, prize, juice.

Lict C: science, examination, stomach, theatre, violin.

The words used with Belinda were:

List A: balloon, canary, scenery, healthy, kindergarten.

List B: plantation, phrase, costume, valuable, plastic.

List C: electricity, refereee, straw, paragraph, lawyer.

Response Definition

Subjects were required to write down on paper each word that the experimenter asked them to spell. The dependent variable was the number of words the subject spelt correctly on posttests for each set of five words. A word was defined as correct if it matched the word on the experimenter's list or word card, letter for letter, and in the correct sequence. A word that had been erased or crossed over and written again was considered correct if it matched the experimenter's copy of the word. The number of words correctly spelt in each of the three word lists was counted and recorded daily for each subject.

Experimental Design

An alternating treatments design (Barlow & Hayes, 1979; Kazdin & Hartmann, 1978) was used to compare the relative effectiveness of two training conditions, overcorrection and imitation training, against a no-training control condition on the acquisition of spelling by four moderately mentally retarded adolescents. Experimental sessions of approximately twenty minutes were implemented separately for each subject, daily.

Experimental Conditions

The three lists of words were randomly assigned to the three experimental conditions which were administered daily in a counter-balanced order. List A words were assigned to the no-remediation control condition, List B to the overcorrection training condition and List C to the imitation training condition.

The study consisted of the following phases:

Baseline. During the baseline phase, each subject was asked to spell each word on his or her spelling list. Subjects were required to spell the words by writing them down on a piece of paper. The experimenter gave the following instructions to the subjects: "I am going to ask you to spell some words. Write down each word as I ask you to spell it. For each word you spell correctly I will praise you for your good work. Please try your best". The experimenter then read the words from the three spelling lists. Each correct response was followed by descriptive praise, while incorrect responses were followed by the next word to be presented.

Alternating Treatments. During the intervention phase the two training and the no-training control procedures were presented

daily in a counterbalanced order, identical for each child. Each training session was prefaced by specific instructions regarding the procedure to be implemented, thus increasing the discriminability of the three procedures (Barrett, Matson, Shapiro, & Ollendick, 1981; Kazdin & Hartmann, 1978). The alternating treatments phase was terminated for each subject when all five words in one of his or her word lists was spelled correctly in the pretest during at least four consecutive sessions.

Overcorrection Training. This procedure was used with List B words with all the four subjects from day four. During this intervention procedure, the child was instructed: "For this set of words, I am going to help you learn those words you misspell by having you listen while I say the word aloud. Then, I want you to pronounce the word correctly. I will then say aloud each letter of the word and then I want you to say aloud each letter of the word as you write it. I want you to repeat this five times for each word you misspell. For each word you spell correctly, I will praise you for your good work. Please try your best". Thus the sequence was:

(i) The experimenter pronounced the word.

(ii) The child wrote the word down, saying aloud each letter as it was written.

(iii) The child was positively reinforced with descriptive praise if the word was correctly spelled, and the experimenter pronounced the next word; or

If the child misspelled the word, the following sequence was followed:

(iv) The experimenter pronounced the word.

(v) The child pronounced the word.

(iv) The experimenter said aloud each letter of the word.

(vii) The child said aloud each letter of the word as he or she wrote the word correctly.

(viii) This sequence was repeated five times. Then the experimenter went on to the next word on the appropriate word list.

Posttest. After training on the five unknown words in List B, each subject was tested on all five words (in random order) as in baseline. If a word was spelled correctly, the subject was reinforced with descriptive praise. If it was spelled incorrectly the next word was introduced.

Imitation Training. This procedure was used with List C words with all subjects from day four. During this procedure the child was instructed: "For this set of words I am going to help you learn those words you misspell by having you listen while I pronounce the word, use it in a sentence, spell it aloud and then show you the word written on a piece of paper. Then I want you to pronounce the word, spell it aloud and write it down on a piece of paper. For each word you spell correctly I will praise you for your good work. Please try your best". Thus a three step sequence was followed:

(i) The experimenter pronounced the word (e.g. name). A sentence using name would be: "My name is Vicky". Name is spelled n-a-m-e. This is the way to write n-a-m-e. A card with the word written on it was shown to the child. Pointing to each letter, the experimenter again spelled the word n-a-m-e.

(ii) The word card was removed and the child was asked to spell "name" aloud. The child was expected to spell the word aloud.

(iii) If the child spelled the word correctly, he or she was praised for his good work, e.g. "Good spelling. That is the way to spell name". The experimenter then moved on to step (iii).

(iv) If the child spelled the word incorrectly the experimenter said: "No, that is not how you spell name. Let's look again". The word card was presented again, and the experimenter said "The word is name, n-a-m-e. You spell it after me, n-a-m-e. Use of the word card was continued until success was achieved.

(v) With the word card out of view the child was instructed: "Write (name) down on a piece of paper".

(vi) If the child responded correctly, he was verbally praised for his good work. Then the next stimulus word was tackled using the same procedure.

(vii) Following an incorrect response the experimenter corrected the response saying "No, that is not how you spell name. Let's look again". Then the word was presented again and the experimenter spelled the word aloud and pointed to each letter as it was called. With the word card visible, the subject was instructed to write the word again. The experimenter continued to use the word card until success was achieved.

(viii) Following a correct response, the experimenter said "Good spelling" removed the word card from view and instructed the subject to "write name". If the child responded correctly he was given the appropriate

verbal reinforcement, and the same procedure was continued with the next word on the relevant word list. If the response was incorrect they went back to step (vii) to continue this sequence. This procedure was repeated until the child responded correctly without models or prompts to the experimenter's instructions to "Spell the word aloud and write it on your piece of paper".

Each word on List C was taught in this manner using the imitation training procedures.

Posttest. After training on the five unknown words in List C, each subject was tested on all five words (in random order) as in baseline. If a word was spelled correctly, the subject was reinforced with descriptive praise. If it was spelled incorrectly the next word was introduced.

Control Condition. The procedure for the no-remediation control condition was identical to that in the baseline phase. Subjects were praised for each word they spelled correctly.

Final Phase. During the final phase, the more effective of the two remediation procedures used in the previous phase was used with all three word lists during daily sessions. This phase was terminated when subjects had achieved 100% correct responding on all three word lists during the posttest condition.

Follow up. Following the termination of the experimental phases, follow up checks were conducted under baseline conditions. These were conducted at one, two and three months. The remediation procedure was reinstituted if a subject made a spelling error during the maintenance checks.

Data Collection and Reliability

Data were collected by one experimenter (a graduate student in psychology) who had practised implementing the experimental procedures before baseline recording commenced. As subjects were required to write down each word they were asked to spell, it was possible to check agreement on the scoring of the words and adherence to the experimental conditions. The written responses of each subject's daily worksheets and posttests were checked by an independent rater (another graduate student). These checks involved rescoring the words to ensure previous scores were accurate. Inter-rater agreement was computed by a word-by-word analysis, and revealed 100% agreement on scoring papers. The subjects' worksheets were also scrutinised to ensure that the appropriate experimental conditions had been used correctly. All sessions throughout the study were audiotaped, and responses were also rated from these recordings. The independent rater randomly selected 25% of the audiotaped sessions to check that all aspects of the various procedures were being correctly implemented. In all such sessions the experimenter was observed to be following the correct procedures.

RESULTS

Figure 1 shows the number of words spelt accurately by each subject during baseline and post-tests in the intervention phases. The baseline performance of each subject was completely stable maintaining zero words spelled correctly throughout this condition. The number of words spelled correctly by all subjects began to increase with the introduction of the two training procedures during intervention but remained low for the no-remediation control condition. Imitation training was implemented for each subject in the final phase, as the words learned using this

procedure were first to meet the mastery criterion of 100% accuracy for four consecutive days during the alternating treatments phase. The long term follow up data showed that all but one subject maintained 100% accuracy during follow up. One subject showed a minor drop in accuracy on those words initially learnt through overcorrection procedures.

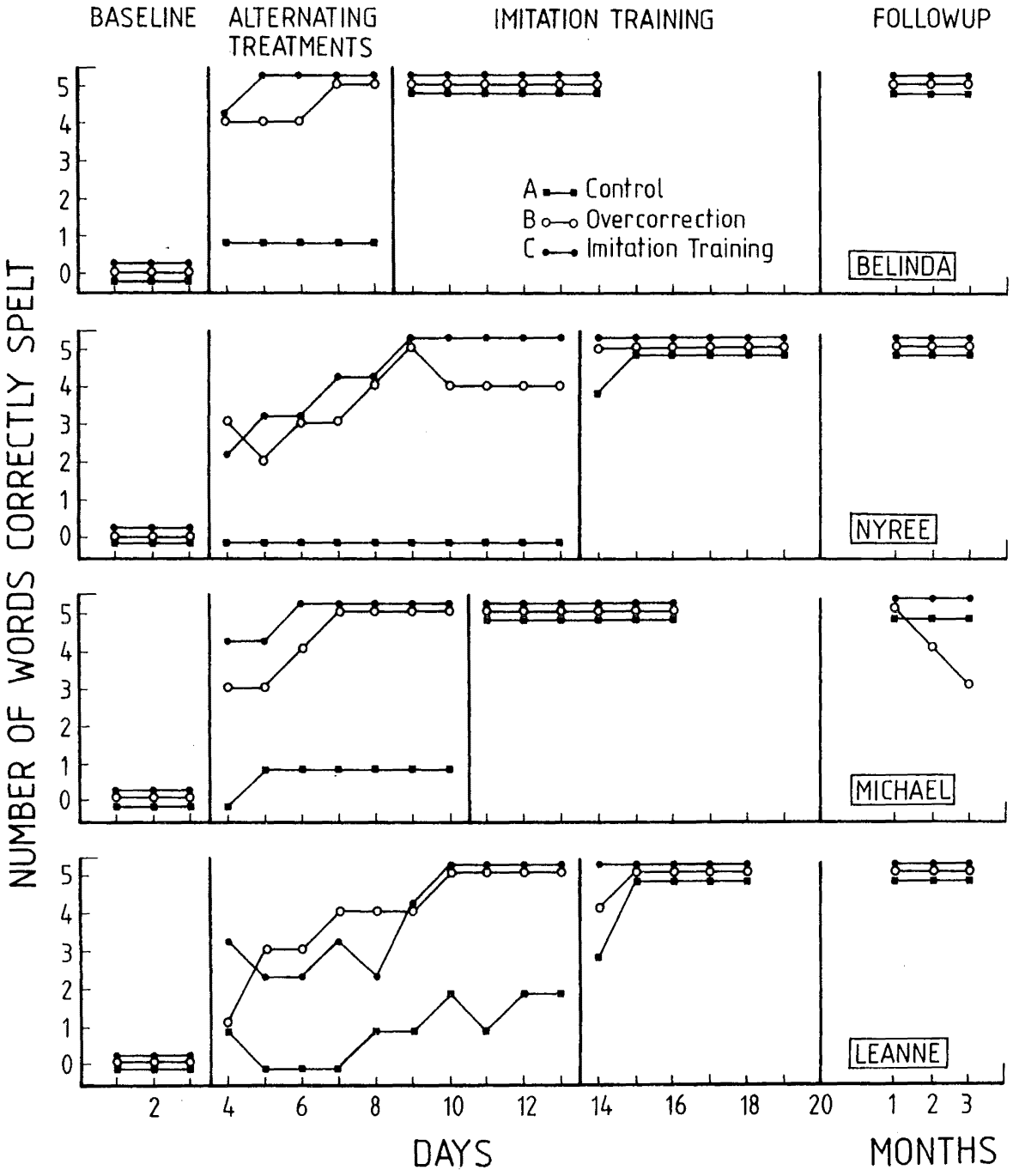
The results for Belinda in Figure 1, indicate improved spelling accuracy in all conditions in the alternating treatment phase. However, the two training procedures produce the most dramatic increase in spelling accuracy from baseline levels. The imitation training procedure resulted in more rapid learning which was maintained over the time period required for achieving the criterion of spelling mastery. As a result of the better performance of the subjects under the imitation procedure, this method was utilised with each word list in the final phase producing increased spelling accuracy for all of these words.

Insert Figure 1 about here

The data for Nyree given in Figure 1 shows that spelling improvement only occurred under the two training conditions. No learning occurred for List A words under the control condition. Imitation training resulted in more rapid learning and was thus implemented for all word lists in the final phase. This resulted in increased spelling accuracy for List B and List C words. During follow up all words were spelt with 100% accuracy.

FIGURE 1

Number of words spelt correctly by each subject during baseline, intervention, and follow up.


BASELINE
ALTERNATING TREATMENTS
IMITATION TRAINING
FOLLOWUP
A Control
B Overcorrection
C Imitation Training
BELINDA
NYREE
MICHAEL
LEANNE
NUMBER OF WORDS CORRECTLY SPELT
0
1
2
3
4
5
2
4
6
8
10
12
14
16
18
20
1
2
3
DAYS
MONTHS

The data for Michael show improved spelling accuracy in the alternating treatments phase from zero baseline levels. All conditions resulted in improved spelling performance in the alternating treatments phase, however, the two training procedures produced the most marked effects. The imitation training procedure was marginally superior to overcorrection in improving spelling accuracy so was used in the final phase for all word lists. Follow up demonstrated variable performance. The word list associated with overcorrection, List B, produced the lowest levels of spelling accuracy during follow up while List A and List C words were learnt to 100% accuracy.

The results for Leanne in Figure 1, indicate the most variable performances of spelling accuracy during the alternating treatments phase, in comparison to the other subjects. Both increases and decreases in spelling accuracy levels were noted for all word lists in this phase. While all conditions during the alternating treatments phase resulted in improved spelling accuracy over baseline levels, the mean number of words spelled correctly was highest for imitation training. However, there was no difference between imitation training and overcorrection procedures in terms of the mastery criterion. In line with the other subjects, imitation training was chosen for the other word lists in the final phase. Follow up data showed 100% accuracy.

DISCUSSION

The results of Experiment 1 demonstrated the differential efficacy of two training procedures, overcorrection and imitating training, in remediating spelling deficits in moderately mentally retarded children. While these two procedures were effective in significantly increasing spelling achievement over baseline and control conditions, imitation

training was superior, consistently producing the highest levels of spelling accuracy.

The effectiveness of both training procedures in the present experiment lends further support to the findings of previous studies which have utilized them. Overcorrection has been previously used successfully to increase the spelling and oral reading ability of normal, emotionally disturbed, and mildly and moderately mentally handicapped children in educational settings. (e.g., Foxx & Jones, 1978; Matson et al, 1982; Ollendick et al, 1980; Singh et al, 1984). Imitation training procedures were effectively used to teach learning disabled children to spell a number of words (Jobes, 1975).

In addition, the present study extended these findings. Use of these two training procedures together in an alternating treatments phase enabled an evaluation of the comparative efficacy of these remediation strategies that had been previously demonstrated as successful when used separately. Previous findings were also extended to include children of moderate mental retardation.

Three subjects in this study demonstrated increased spelling accuracy during the alternating treatments phase for List A words which were assigned the no training control condition. The introduction of the training conditions during the alternating treatments phase may have had a spill-over effect, in that certain elements taught in the remedial sessions may have been used by subjects with the no-remediation control words. For example more attention may have been paid to each word in List A as a result of training in other word lists which may account for the slight spelling gains.

Previous studies on overcorrection procedures have attributed its efficacy in enhancing spelling achievement to variations in the

procedure which provide opportunities for individuals to learn the correct response rather than to receive punishment for incorrect responses. The imitation training procedure follows a similar sequential approach which also presents varied opportunities for learning. In addition to the overcorrection method, imitation training included a visual element and more teacher-learner interaction which may have contributed to the increased efficacy of this approach.

EXPERIMENT 2

The effects of imitation training and interspersal training on spelling acquisition

Experiment 1 demonstrated that imitation training was more effective than overcorrection training in the remediation of spelling deficits in moderately mentally handicapped individuals. Following the approach of evaluating the efficacy of two training techniques previously found to be successful, Experiment 2 was designed to assess the comparative effects of imitation training andinterspersal training against a no-remediation control for improving spelling achievement. In two studies, Neef et al (1977, 1980) have demonstrated that interspersing known items (i.e., words that the subject can spell accurately) among unknown items (i.e., words that the subject cannot spell correctly) produces higher levels of spelling than a high density reinforcement condition.

M É T H O D

Subjects

Three students attending the same special school as subjects in Experiment 1 were selected to participate in this study. However, the subjects in Experiment 2 were from different classrooms. These students were moderately mentally retarded as assessed on AAMD criteria (Grossman 1983). The etiology of retardation of one subject - girl (Marie) was not known. The two other subjects - two girls (Jane and Fiona) had Down's Syndrome. None of the subjects suffered from epilepsy or were on medication during the duration of the study.

Marie was 12 years old and had an I.Q. of less than 40 on the WISC-R. Her vision and hearing were not formally assessed at the time of study, but the school records reported them as

satisfactory. During the final few weeks of testing, this subject was integrated into a normal primary school special class. To maintain experimental continuity daily sessions were conducted in her new environment.

Jane was 18 years old and had an I.Q. range of 35 - 45 on the revised Stanford-Binet Intelligence Scale (Form L-M). Jane wore glasses to correct visual problems related to strabismus and myopia, and hearing aids for mild hearing loss in both ears.

Fiona was 16 years old and had an I.Q. range of 49 - 59 on the Revised Stanford-Binet Intelligence Scale (Form L-M). Her hearing was reported to be within normal limits and her vision had a tendency to strabismus which was under the care of an eye specialist. Visual problems did not appear to have any adverse affects on her learning.

None of the subjects had received any form of spelling instruction prior to this study. The criterion for subject selection was the ability to recognise and write down on paper all the letters of the alphabet. The two older subjects, Jane and Fiona, were from a senior class while Marie was from a class of younger children.

Setting

The setting for this experiment was the same as in Experiment 1. This setting was altered for Marie who was integrated into another school during the final few weeks of testing. However, attempts were made to retain a similar type of experimental setting, that is, a small separate room containing tables and chairs was utilized.

Stimulus Material

Stimulus words used for the spelling exercises were taken from

the Arvidson Alphabetical Spelling List (1969). The target spelling words for each subject were selected on the basis of two paper and pencil test sessions. Only words that the subjects misspelt consistently in both sessions were selected for training. Words that were consistently spelt correctly in both sessions were selected as a source of known spelling words. For each subject, a total of 30 error words were selected. These unknown target words were then randomly assigned to three sets of five words each, List A, List B and List C, and a reserve pool of 15 words. These word lists were randomly assigned to one of the experimental conditions: List A: Imitation Training, List B: No-remediation Control Condition, and List C: Interspersal Training. In addition, a list of five words was selected for each subject from her source of known words that she could consistently spell correctly. The stimulus words for all subjects were taken from Levels 1 and 2 (difficulty level).

When the lists of words for each subject were selected attempts were made to include a similar number of nouns, verbs and adjectives in each list, and to include words with an equivalent number of letters across subjects. An exact equivalence of stimulus words selected for subjects was not possible as words were being replaced in different word lists at different rates across subjects, reflecting differing speeds of learning.

The initial word lists used with Jane were:

List A: old, tree, name, happy, snow

List B: fun, girl, room, please, teacher

List C: say, live, milk, pretty, house

Known word list: you, hat, read, can dig

The initial word lists used with Fiona were:

List A: cry, man, play, little, write

List B: dog, girl, rain, sister, mother

List C: tell, long, milk, pretty, heard

Known word list: big, good, happy, up, book

The initial word lists used with Marie were:

List A: dig, ball, name, water, read

List B: fun, girl, baby, school, teacher

List C: say, five, milk, please, time

Known word list: cat, me, so, car, tree

Response Definition

Subjects were required to write down on paper each word that the experimenter asked them to spell. The dependent variable was the number of words the subject spelt correctly on posttests for each set of five words. A word was defined as correct if it matched the word on the experimenter's list or word card, letter for letter, and in the correct sequence. A word that had been erased or crossed over and written again was considered correct if it matched the experimenter's copy of the word. The number of words correctly spelt in each of the three word lists was counted and recorded daily for each subject. In addition, the cumulative number of spelling words mastered in each word list was recorded over daily sessions for each subject. A word was defined as learned or mastered when it was spelled correctly during testing over three consecutive sessions.

Experimental Design

An alternating treatments design (Barlow & Hayes, 1979; Kazdin & Hartmann, 1978) was used to compare the relative efficacy of two training procedures, imitation and interspersal training, against a no-training control condition, on the acquisition of spelling by thre moderately mentally handicapped adolescents. Experimental sessions of approximately 20 minutes were implemented separately for each subject, daily.

Experimental Conditions

The three lists of words were randomly assigned to the three experimental conditions which were administered daily in a counter-balanced order. List A words were assigned to the imitation training condition, List B to the no-remediation control condition, and List C to the interspersal training condition.

The study consisted of the following phases:

Baseline. During the baseline phase, each subject was asked to spell each word on her spelling list. Subjects were required to spell the words by writing them down on a piece of paper. The experimenter gave the following instructions to each subject: "I am going to ask you to spell some words. Write down each word as I say it aloud. As you spell the word I want you to say aloud each letter as you write it down. For each word you spell correctly I will praise you for your good work. Please try your best". The experimenter then read the words from the three spelling lists. Each correct response was followed by descriptive praise, for example, "Good spelling, Jane; That is the correct spelling." If a word was spelt incorrectly the experimenter told the child what the correct spelling was and then moved on to the

next word to be presented. The baseline phase lasted for three consecutive days.

Alternating Treatments. During the intervention phase the two training and the no-treatment control procedures were presented daily in a counterbalanced order, identical for each child. Each training session was prefaced by specific instructions regarding the procedure to be implemented, thus increasing the discriminability of the three procedures (Barrett et.al., 1981; Kazdin & Hartmann, 1978).

Imitation Training. This procedure was introduced to List A words across all subjects on day four. The training procedure was the same as for Experiment 1, except that when a word had reached the learning criterion (i.e., a correct response was given over three consecutive sessions), it replaced a word which had been in the known word list for the longest period, and a new word from the unknown reserve pool was placed in the imitation training list.

Posttest. After training on the five unknown words in List A, each subject was tested on all five words (in random order) as in base line. If a word was spelled correctly the subject was reinforced with descriptive praise; if it was spelled incorrectly the experimenter told the subject the correct spelling.

Interspersal Training. This procedure was introduced to List C words across all subjects on day four, and utilised the word list containing five known words prepared during initial testing. Each session consisted of 10 trials: five error words (i.e., List C words) and five known words, were presented in alternating order. Subjects were given the same instructions as in baseline. If a word was spelt correctly, the subject was reinforced with descriptive praise. If a word was spelt incorrectly, a three step training sequence was

implemented: (i) experimenter circled the incorrect letters written by the subject, (ii) experimenter said aloud each letter of the word, and (iii) asked the subject to write the word correctly three times.

This procedure was repeated until the subject could write the word three times correctly as requested. As with the other procedures, learning criterion for a given word was a correct response over three consecutive sessions. Once a subject met this learning criterion, that word was added to her list of known words and the word which had been in this list the longest was deleted. A word from the pool of reserve or unlearned words was then added to List C, thus at all times each subject had five known and five unknown words for interspersal training.

Posttest. After the ten training trials with List C, each subject was tested on the five unknown words in random order under baseline conditions. If a word was spelt correctly the subject was reinforced with descriptive praise; if it was spelled incorrectly the experimenter told the subject the correct spelling.

Control Condition. The procedure for the no-training control condition was identical to that in the baseline phase. If a word was spelt correctly subjects were reinforced with descriptive praise; if it was spelt incorrectly the experimenter told the subject the correct spelling. When the subject reached the learning criterion for a given word it was replaced with another word from the pool of fifteen unknown words tested on all the words learned during the study in each word list.

Follow up. Follow up checks were not possible as school had finished for the year with the subjects all going on holiday for two months.

Data Collection and Reliability

Data were collected by one experimenter (a graduate student in psychology) who had practised implementing the experimental procedures before baseline recording commenced. As subjects were required to write down each word they were asked to spell, it was possible to check agreement on the scoring of the words and adherence to the experimental conditions. The written responses of each subject's daily worksheets and posttests were checked by an independent rater (another graduate student). These checks involved rscoring the words to ensure previous scores were accurate. Inter-rater agreement was computed by a word-by-word analysis, and revealed 100% agreement on scoring of papers. The subjects' worksheets were also scrutinised to ensure that the appropriate experimental conditions had been used correctly. All sessions throughout the study were audiotaped, and responses were also rated from these recordings. The independent rater randomly selected 25% of the audiotaped sessions to check that all aspects of the various procedures were being correctly implemented. In all such sessions the experimenter was observed to be following the correct procedures.

RESULTS

Figure 2 indicates the cumulative number of words mastered by each student across experimental conditions. Despite variations in acquisition rate across students, their performance patterns were similar. No correct word spellings were learned by subjects

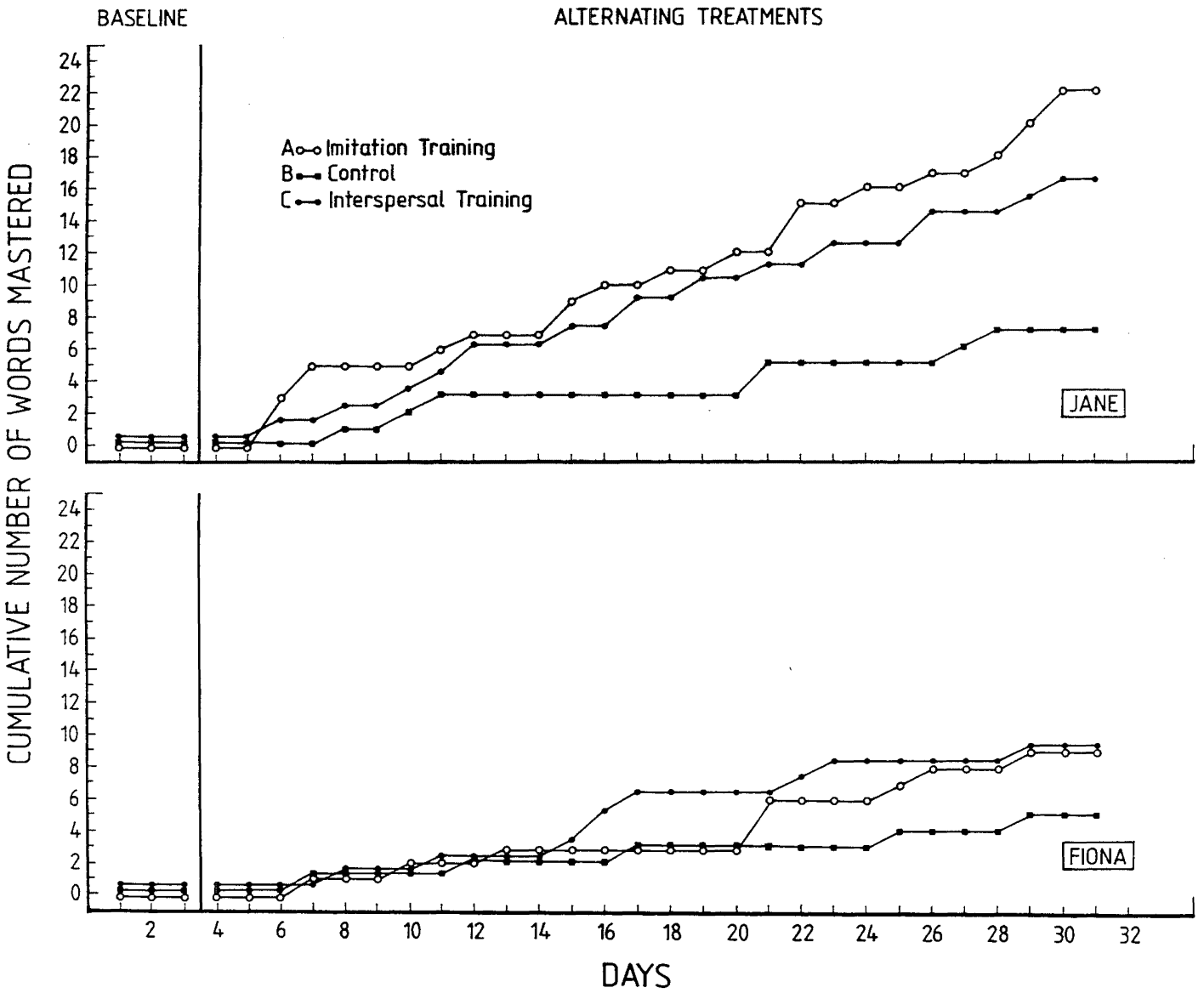
during the baseline phase, however with the introduction of the two training procedures during the alternating treatments phase, the number of words learned began to increase for all subjects under all three conditions. More words were mastered in word lists A and C, which were assigned to the two active training procedures while only a few words were learnt in the control condition.

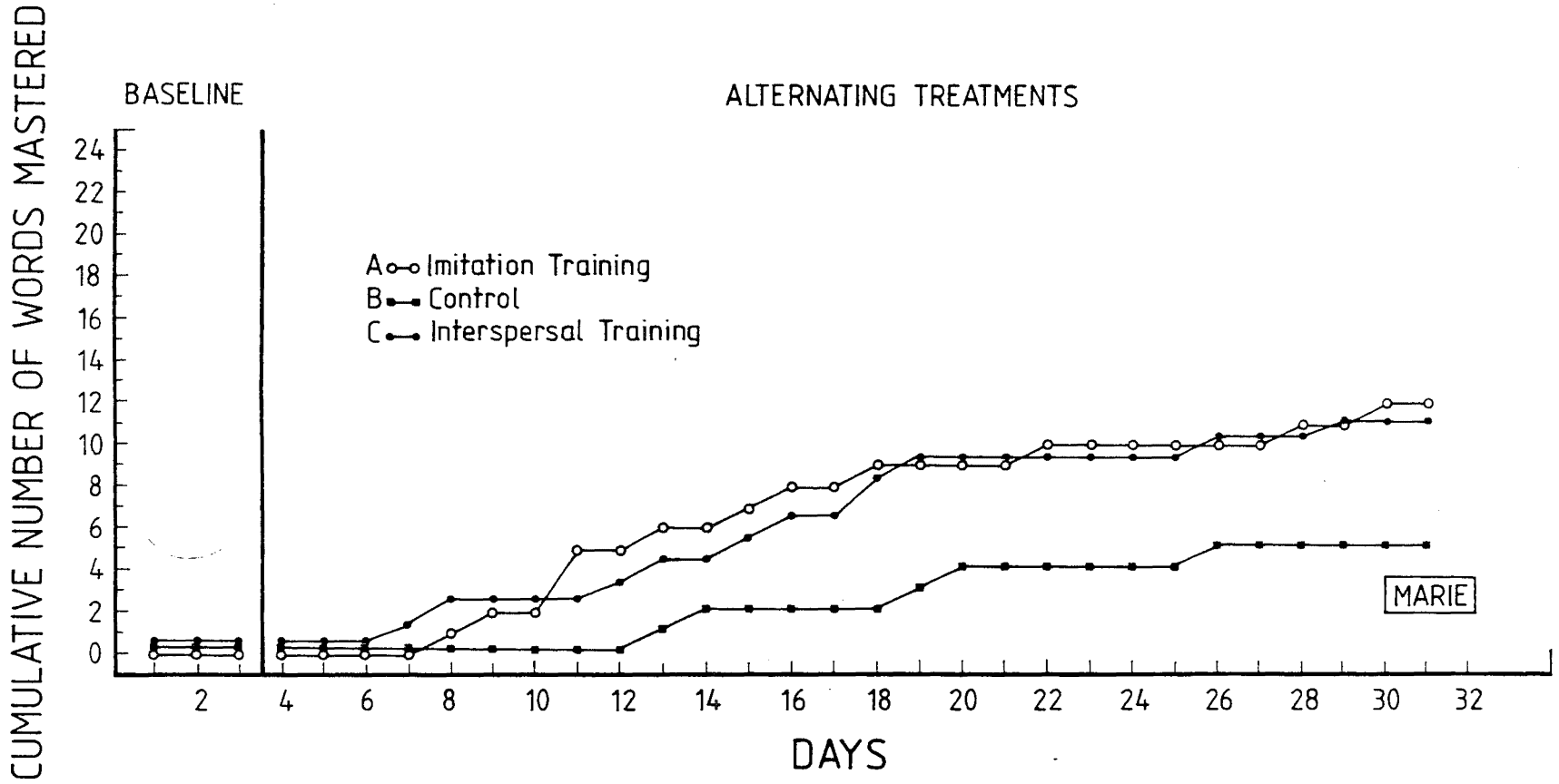
Insert Figure 2 about here

This pattern was more clearly seen with two subjects, Jane and Marie. The results of these two subjects also indicated that more words were cumulatively learned in List A to which imitation training had been assigned. However, the difference between the two conditions is not clinically or statistically significant. The other subject, Fiona, very slowly learned a similar number of words in each word list for the first half of the alternating treatments phase. As this phase continued, more differential effects became obvious, with more words learned through the two active training procedures. However, at termination of the study the number of words Fiona had cumulatively learned was identical for lists A and C. No differences in the efficacy of these training procedures were indicated for this subject.

FIGURE 2

Cumulative number of words spelt to criterion by each subject during baseline and intervention.


BASELINE
ALTERNATING TREATMENTS
A Imitation Training
B Control
C Interspersal Training
JANE
FIONA
CUMULATIVE NUMBER OF WORDS MASTERED
DAYS
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32


CUMULATIVE NUMBER OF WORDS MASTERED
BASELINE
ALTERNATING TREATMENTS
A Imitation Training
B Control
C Interspersal Training
MARIE
DAYS
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32

DISCUSSION

Results of this study indicate that both imitation and interspersal training procedures are more effective than a no-remediation control condition in facilitating spelling acquisition. This replicates previous finding which have demonstrated in separate studies the efficacy of these procedures in enhancing spelling achievement (Jobes, 1975; Neef et al., 1977, 1980). Two subjects showed a slightly higher level of spelling performance in the cumulative number of spelling words mastered for words learned through imitation training, which may point to the superior efficacy of this procedure when compared to interspersal training. However, the difference was minimal and from a practical viewpoint, the efficacy of the procedures can be considered to be about equal. The remaining subject learnt exactly the same cumulative number of words in both the interspersal and imitation training procedures. This particular child learned to spell fewer words than the other subjects overall, and appeared less able. The greater number of words learned by Jane and Marie would have provided more opportunity for a clearer differential effect between the two procedures. The results depicting the cumulative number of spelling words mastered demonstrated that learning was slow but steady for these subjects. Learning appeared to reach a plateau, then after a short time, which may have enabled consolidation of the newly acquired material, further spelling words were mastered.

Marie who was integrated into a normal school toward the end of this experiment was a more able child in comparison to the other subjects. While she did not gain the overall highest score for total number of words learned, this probably reflected the fact that she had more difficult words to spell because of her higher ability level. The

results she produced revealed no difference between the efficacy of interspersal and imitation training procedures. The results of a less able child but with good reading skills (Jane) indicated that she consistently learned to spell more words through the use of imitation training procedures. It may be that the imitation training procedure which incorporates more teacher-directed interaction and visual display of the target word, is a more complete multisensory approach, and in comparison to interspersal training is more appropriate for less able learners. For the other subject (Fiona), who had fewer skills and learned the least number of words throughout this study, there was no difference in the cumulative number of words learned through either imitation or interspersal training. Although only three subjects were used in this investigtion, their results indicate the imitation training procedures may be slightly but not significantly more effective than the interspersal training approach with some individuals. Obviously further research with individuals of varying abilities is necessary to elucidate this possibility.

GENERAL DISCUSSION

In general, the results of the two experiments in this study clearly indicate that some form of active training enhances the spelling achievement of modertely mentally retarded individuals. The level of spelling accuracy improved markedly from baseline rates with the introduction of training procedures during the alternating treatments phase. In Experiment 1, imitation training proved more effective than overcorrection in increasing spelling performance. Experiment 2 followed from the former study by comparing the more successful training procedure to an alternative instructional strategy (interspersal training) which had earlier been shown to be effective (Neef et al., 1980). Overall, imitation training in the second experiment proved very marginally superior to interspersal training.

This type of research is important as it may enable teachers to identify what will be the most effective training procedure in relation to each student's skills and abilities. Previous studies have generally compared the efficacy of one behavioural technique against more traditional approaches to teaching spelling and remediating spelling problems (e.g., Ollendick et al., 1980). Several studies have reported different instructional methods for spelling to be superior to more traditional approaches. These procedures include the add-a-word program (Struthers et al., 1983) imitation training (Jobes, 1975) overcorrection procedures (Foxx et al., 1978), and interspersal training (Neef et al., 1980). These findings were extended in this study by comparing the efficacy of two alternative behavioral methods previously identified as successful. Such an approach could be employed to compare the differential effects of many different instructional methods. For example, future studies

could assess the efficacy of interspersal training and the add-a-word program against a no-remediation control. These studies should include subjects from diverse populations as it may be that one particular training procedure is more effective for students with specific abilities or disabilities.

When the more effective training procedures have been identified, it may be beneficial to investigate alternative ways these instructional methods can be effectively delivered. Previous findings have demonstrated the success of utilizing peers or parents as tutors (e.g., Broden et al., 1978; Delquadri et al., 1983; Dineen et al., 1977). The potential for successfully using peers or parents as tutors in remediating spelling deficits must be enhanced if the underlying instructional method has previously been shown to be effective. The possiblity of using a mentally retarded individual with more skills to tutor another retarded person with less skills should also be examined. Earlier studies indicating the reciprocal benefits gained by both tutor and tutee during a tutoring interaction (e.g., Dineen et al., 1977) should also be considered.

A further strategy for additional work on remediating spelling deficits, particularly in mentally retarded children, may be to incorporate parts of procedures, reported elsewhere as successful, in devising new alternative instructional methods. For example, having discovered in Experiment 2, that imitation training procedures only marginally produce higher levels of spelling accuracy than interspersal training, may lead to a closer evaluation of the effects of interspersal training. This could be attempted by comparing the efficacy of using imitation training procedures alone, and imitation training procedures with interspersed known items against a no-training control. Higher scores associated with the correct spelling of words assigned to the combined interspersal

and imitation training procedure would be attributable to the interspersed elements. Such a procedure may prove more beneficial than either procedure alone.

There appear to be numerous possibilities for extending the research conducted on spelling to date. Continued research in the area of spelling remediation is necessary as spelling is an important academic skill that is required in everyday writing yet a great number of students have difficulty in achieving the required standards (Fox et al., 1946; Graham et al., 1979; Horn 1969). Outcomes from a forming body of research on spelling remediation offer valuable guidance to both educators of mentally retarded and normal individuals in planning and devising effective instructional programs for problem spellers. It can only be hoped that teachers become aware of the most effective methods for teaching spelling and remediating spelling deficits so they can then transform this knowledge into practice.

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